UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/923,727	08/06/2001	Randy Keith Lomnes	470039.401	1112

500 7590 09/15/2008

SEED INTELLECTUAL PROPERTY LAW GROUP PLLC
701 FIFTH AVE
SUITE 5400
SEATTLE, WA 98104

EXAMINER	
TSAI, SHENG JEN	

ART UNIT	PAPER NUMBER
2186	

MAIL DATE	DELIVERY MODE
09/15/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/923,727	LOMNES, RANDY KEITH	
	Examiner	Art Unit	
	SHENG-JEN TSAI	2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 July 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-9, 11, 13-23, 26, 30-46, 49, 53-54, 56-66, 70-79, 81 and 84-101* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3-9,11,13-23,26,30-46,49,53,54,56-66,70-79,81 and 84-101* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 August 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is taken in response to Applicants' Amendments and Remarks filed on July 3, 2008 regarding application 09/923,727 filed on August 6, 2001.

2. Claims 3, 32, 84 and 93 have been amended.

Claims 1-2, 10, 12, 24-25, 27-29, 47-48, 50-52, 55, 67-69, 80 and 82-83 have been cancelled.

Claims 3-9, 11, 13-23, 26, 30-46, 49, 53-54, 56-66, 70-79, 81 and 84-101 are pending for consideration.

3. ***Response to Amendments and Remarks***

Applicant's amendments and remarks have been carefully and fully considered, with the Examiner's response set forth below.

(1) Applicants contend that the "memory manager" of the Harish reference is not an input/output software driver as recited in claim 3. The Examiner disagrees.

First, according to the definition by Microsoft Computer Dictionary (5th edition, Microsoft Press, 2002, page 177), a "driver" is "a hardware device or a program that controls or regulates another device … A software driver is a device-specific control program that enables a computer to work with a particular device."

Based on this definition, the Examiner interprets the element "input/output driver" as "a program that enables a computer to work with an input/output device."

Second, figure 1 of Harish shows a computer system comprising a CPU (102), I/O controller (108), a ROM (104) and a RAM (106), and Harish's invention is directed toward a memory manager that supports memory accessing to/from the ROM and RAM

by external input/output devices [col. 3, lines 14-27]. Further, the functions of the memory manager is implemented in software [as shown in figures 3 and 4; col. 3 line 57 to col. 5, line 17]. Thus, it is clear that the functions performed by the memory manager include that of an input/output driver, and more.

Third, as Examiner indicated over the phone interview, the overall functions of the memory manager of Harish is broader and more complex than an input/output driver, thus the Examiner is not disputing that they are not the same. However, since the functions performed by the memory manager include that of an input/output driver, it would qualify as an input/output driver within the context of the claimed limitations of claim 3.

Fourth, it should also be noted that any software must be loaded into a computer system before it can be executed to perform the intended functions. Thus “loading” or “installing” a software driver into a computer system is an inherent step of computer implemented operations.

(2) Applicant contends that the Examiner applied claim analysis of claim 3 to claims 72 and 79 even though the claimed limitations of claims 72 and 79 contain elements that are not presented in claim 3.

In response, a separate and individual claim analysis for claims 72 and 79 has been presented in this Office Action. Refer to the corresponding sections of the following claim analysis for details.

(3) Another non-final action based on the previously relied on references has been made. Refer to the corresponding sections of the following claim analysis for details.

Claim Objections

4. Claims 94-101 are objected to because of the following informalities:

Each of claims 94-101 recites "The computer-readable medium of claim 93, wherein …" However, claim 93 recites "A computer-readable memory medium containing …"

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3-9, 11, 13-15, 30-40, 53-54, 56-66, 71-79, 81 and 84-101 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harish et al. (U.S. 5,940,850, hereinafter referred to as Harish).

As to claim 3, Harish discloses **a method in a computer system** [system and Method for Selectively Enabling Load-On-Write of Dynamic ROM Data to RAM (title)] **for automatically protecting data stored in a portion of a storage device** [A system and method for loading dynamic data stored in read-only memory (ROM) is loaded into

random access memory (RAM) only when it is being modified. Unmodified dynamic data is used from ROM saving valuable RAM space. Virtual memory page table entries are created for all dynamic data with the physical reference pointing to the dynamic data in ROM. Page table entries in a translation table for dynamic data in ROM include a virtual address to physical address mapping and are marked read-only causing a write-access exception if an attempt is made to write to or update the dynamic data. Write-access exceptions are intercepted, and a write-access exception caused by an attempt to write to dynamic data in ROM causes the system to allocate a dynamic data page in RAM, copy the ROM data to the RAM, update the page table entry to point to the RAM page rather than the ROM page, and finally to update the dynamic data now present in read-write RAM (abstract)] **having a designated protected space** [the corresponding designated protected space is the ROM, figure 1, 104, figure 2, 210], **the computer system having a designated unprotected space** [the corresponding designated unprotected space the RAM, figure 1, 106, figure 2, 216] **and a redirected space** [the RAM (figure 1, 106, figure 2, 216) also serves as a redirected space], **comprising**:

Loading a software redirection driver into an input/output driver hierarchy [it should also be noted that any software must be loaded into a computer system before it can be executed to perform the intended functions. Thus “loading” or “installing” a software driver into a computer system is an inherent step of computer implemented operations; the flowcharts and operations of the software redirection driver are shown in figures 3 and 4; First, according to the definition by Microsoft Computer Dictionary (5th

edition, Microsoft Press, 2002, page 177), a "driver" is "a hardware device or a program that controls or regulates another device … A software driver is a device-specific control program that enables a computer to work with a particular device." Based on this definition, the Examiner interprets the element "input/output driver" as "a program that enables a computer to work with an input/output device." Second, figure 1 of Harish shows a computer system comprising a CPU (102), I/O controller (108), a ROM (104) and a RAM (106), and Harish's invention is directed toward a memory manager that supports memory accessing to/from the ROM and RAM by external input/output devices (col. 3, lines 14-27). Further, the functions of the memory manager is implemented in software (as shown in figures 3 and 4; col. 3 line 57 to col. 5, line 17). Thus, it is clear that the functions performed by the memory manager include that of an input/output driver, and more. Third, as Examiner indicated over the phone interview, the overall functions of the memory manager of Harish is broader and more complex than an input/output driver, thus the Examiner is not disputing that they are not the same. However, since the functions performed by the memory manager include that of an input/output driver, it would qualify as an input/output driver within the context of the claimed limitations of claim 3; the input/output driver hierarchy comprising software layers for performing translating of a virtual address into the corresponding physical address (col. 3 line 57 to col. 4 line 20), accessing physical addresses in ROM or RAM (col. 3 line 57 to col. 4 line 20), and intercepting write-access and test whether the physical access references data in ROM (col. 4, lines 20-49)] **loaded into a volatile memory of the computer system during power-up initialization** [The operating

system initializes a virtual memory manager … (column 4, line 57 to column 5, line 18); note that RAM is a volatile memory], **wherein the software redirection driver is an input/output driver** [the flowcharts and operations of the software redirection driver are shown in figures 3 and 4; First, according to the definition by Microsoft Computer Dictionary (5th edition, Microsoft Press, 2002, page 177), a "driver" is "a hardware device or a program that controls or regulates another device … A software driver is a device-specific control program that enables a computer to work with a particular device." Based on this definition, the Examiner interprets the element "input/output driver" as "a program that enables a computer to work with an input/output device." Second, figure 1 of Harish shows a computer system comprising a CPU (102), I/O controller (108), a ROM (104) and a RAM (106), and Harish's invention is directed toward a memory manager that supports memory accessing to/from the ROM and RAM by external input/output devices (col. 3, lines 14-27). Further, the functions of the memory manager is implemented in software (as shown in figures 3 and 4; col. 3 line 57 to col. 5, line 17). Thus, it is clear that the functions performed by the memory manager include that of an input/output driver, and more. Third, as Examiner indicated over the phone interview, the overall functions of the memory manager of Harish is broader and more complex than an input/output driver, thus the Examiner is not disputing that they are not the same. However, since the functions performed by the memory manager include that of an input/output driver, it would qualify as an input/output driver within the context of the claimed limitations of claim 3];

Under control of code of the loaded software redirection driver [the flowcharts and operations of the software redirection driver are shown in figures 3 and 4], **redirecting input/output requests** [figure 1 of Harish shows a computer system comprising a CPU (102), I/O controller (108), a ROM (104) and a RAM (106), and Harish's invention is directed toward a memory manager that supports memory accessing to/from the ROM and RAM by external input/output devices (col. 3, lines 14-27)] by:

intercepting from requesting code a request to modify a location in the protected space of the storage device [Write-access exceptions are intercepted, and a write-access exception caused by an attempt to write to dynamic data in ROM causes the system to allocate a dynamic data page in RAM, copy the ROM data to the RAM, update the page table entry to point to the RAM page rather than the ROM page, and finally to update the dynamic data now present in read-write RAM (abstract); column 4, lines 15-36] **or to a location in an unprotected space** [the corresponding designated unprotected space is the RAM, figure 1, 106, figure 2, 216];

when the request is to modify a location in the unprotected space [the corresponding designated unprotected space is the RAM, figure 1, 106, figure 2, 216]**,**

initiating modification of the location in the unprotected space without redirection [this is inherently what RAM is for and how RAM works]**; and**

when the request is to modify a location in the protected space [the corresponding designated protected space is the ROM, figure 1, 104, figure 2, 210; Write-access exceptions are intercepted, and a write-access exception caused by an attempt to write to dynamic data in ROM causes the system to allocate a dynamic data page in RAM,

copy the ROM data to the RAM, update the page table entry to point to the RAM page rather than the ROM page, and finally to update the dynamic data now present in read-write RAM (abstract)],

determining a location in the redirected space that is associated with the location in the protected space [by using the page table as shown in figure 2; column 4, lines 6-50]; **and**

redirecting the intercepted request to modify the determined location in the redirected space instead of the location in the protected space, in a manner that is transparent to the requesting code [the RAM (figure 1, 106, figure 2, 216) also serves as a redirected space; Write-access exceptions are intercepted, and a write-access exception caused by an attempt to write to dynamic data in ROM causes the system to allocate a dynamic data page in RAM, copy the ROM data to the RAM, update the page table entry to point to the RAM page rather than the ROM page, and finally to update the dynamic data now present in read-write RAM (abstract); figures 3 and 4; column 4, line 6 to column 5, line18],

In response to a received request to shutdown the computer system, disregarding the data in the redirected space [the contents of RAM, the redirected space, would be lost upon shutdown of the computer system because RAM is a volatile memory and can not maintain the contents when power is removed];

After the disregarding of the data in the redirected space, intercepting from requesting code a request to read the location in the protected space [Unmodified dynamic data is used from ROM saving valuable RAM space (abstract)]; and

In response to the intercepting of the request to read the location in the protected space, providing data from the location in the protected space instead of providing data from the redirected space [Unmodified dynamic data is used from ROM saving valuable RAM space (abstract)], **so that the data stored in the location in the protected space automatically remains unaltered when the computer system is restarted from a powered-down state** [the contents of the ROM (figure 1, 104, figure 2, 210) remains unaltered because it is read-only].

Regarding claim 3, Harish does not explicitly mention "in response to a received request to shutdown the computer system, disregarding the data in the redirected space."

However, it is a common knowledge and a common practice that a computer system would be shut down from time to time for the purpose of maintenance or upgrading. For example, the Window operating system provides window commands to allow users to shutdown a PC (START→ SHUT DOWN).

Further, the corresponding designated redirection space of Harish's invention is the RAM (figure 1, 106, figure 2, 216), and the contents of RAM will be lost (i.e., disregard) upon the shutdown of the power because RAM is a volatile memory.

Therefore, it would have been obvious for one of ordinary skills in the art at the time of Applicant's invention to recognize the fact that a computer system would be shutdown from time to time for the purpose of maintenance or upgrading, as exemplified by the PCs running Window operating system, and the fact that the contents of RAM will be lost (i.e., disregard) upon the shutdown of the power because

RAM is a volatile memory, to realize that this particular limitation is a common knowledge and a common practice in the art, hence lacking patentable significance.

Further, claims 32, 54, 72, 79, 84 and 93 are rejected due to the same reasoning as provided in "As to claim 3."

As to claim 4, Harish teaches **the method of claim 3 wherein a redirection driver** [the flowcharts and operations of the software redirection driver are shown in figures 3 and 4] **performs the intercepting the request** [Write-access exceptions are intercepted, and a write-access exception caused by an attempt to write to dynamic data in ROM causes the system to allocate a dynamic data page in RAM, copy the ROM data to the RAM, update the page table entry to point to the RAM page rather than the ROM page, and finally to update the dynamic data now present in read-write RAM (abstract); figures 3 and 4; column 4, line 6 to column 5, line18], **determining the location in the redirected space** [by using the page table as shown in figure 2; column 4, lines 6-50]**, and redirecting the intercepted request** [abstract; figures 3 and 4; column 4, line 6 to column 5, line18].

As to claim 5, Harish teaches that **the driver is inserted into a driver hierarchy that is controlled by an operating system of the computer system** [The operating system initializes a virtual memory manager … (column 4, line 57 to column 5, line 18)].

As to claim 6, Harish teaches that **the designated protected space of the storage device comprises the entire storage device** [the corresponding designated protected space is the ROM, figure 1, 104, figure 2, 210].

As to claim 7, Harish teaches that **the determined location in the redirected space resides in the storage device** [the RAM (figure 1, 106, figure 2, 216) also serves as a redirected space].

Further, claims 34 and 59 are rejected due to the same reasoning as provided in "As to claim 7."

As to claim 8, Harish teaches that **the determined location in the redirected space resides in another storage device** [the RAM (figure 1, 106, figure 2, 216) also serves as a redirected space].

Further, claims 33, 35, and 58 are rejected due to the same reasoning as provided in "As to claims 6 and 8."

As to claim 9, Harish teaches **the method of claim 3. further comprising**:

intercepting from requesting code a request to read the location in the protected space of the storage device [abstract; figures 3 and 4; column 4, line 6 to column 5, line18];

determining the location in the redirected space that is associated with the location in the protected space [by using the page table as shown in figure 2; column 4, lines 6-50]; **and**

automatically redirecting the intercepted request to read from the determined location in the redirected space instead of from the location in the protected space in a manner that is transparent to the requesting code [since only RAM has the updated data -- update the page table entry to point to the RAM page rather than

the ROM page, and finally to update the dynamic data now present in read-write RAM (abstract); figures 3 and 4; column 4, line 6 to column 5, line18].

Further, claims 36, 60, and 81 are rejected due to the same reasoning as provided in "As to claim 9."

As to claim 11, Harish teaches that **the request to access a location in the protected space is a request to write to the protected space** [Write-access exceptions are intercepted, and a write-access exception caused by an attempt to write to dynamic data in ROM causes the system to allocate a dynamic data page in RAM, copy the ROM data to the RAM, update the page table entry to point to the RAM page rather than the ROM page, and finally to update the dynamic data now present in read-write RAM (abstract); figures 3 and 4; column 4, line 6 to column 5, line18].

Further, claims 37 and 61 are rejected due to the same reasoning as provided in "As to claim 11."

As to claim 13, Harish teaches **the redirecting the intercepted write request results in automatically allocating available space to use as new redirected space and writing data to a location in the new redirected space** [load-on-write (title); abstract; figures 3 and 4; column 4, line 6 to column 5, line18].

As to claims 14 and 39, Harish teaches **the determining the location in the redirected space that is associated with the location in the protected space further comprises first allocating available space to be used as the redirected space** [load-on-write (title); abstract; figures 3 and 4; column 4, line 6 to column 5, line18].

As to claims 15, 40, and 62, Harish teaches that **the storage device is one of a hard disk drive, a read/write CD ROM drive, a floppy disk drive, and a semi-persistent storage device** [ROM and RAM, figures 1 and 2].

As to claim 30, Harish teaches **using redirection tables to associate locations in the protected space to locations in the redirected space** [the page table, figure 2, 202; figures 3 and 4; column 4, line 6 to column 5, line18].

As to claim 31, Harish teaches that **the redirection tables comprise at least one of a protected space redirection table, an available space table, and an unprotected space table** [the page table, figure 2, 202; these pages are tracked using a page table that cross references … (column 3, line 63 to column 4, line36)].

As to claim 32, refer to "As to claim 3."

As to claim 38, refer to "As to claim 3."

As to claim 53, refer to "As to claim 30."

As to claim 54, refer to "As to claim 3."

As to claim 56, refer to "As to claim 30."

As to claim 57, refer to "As to claim 27."

As to claim 58, refer to "As to claim 8."

As to claim 59, refer to "As to claim 7."

As to claim 60, refer to "As to claim 3."

As to claim 61, refer to "As to claim 3."

As to claim 62, refer to "As to claim 15."

As to claim 63, Harish teaches that **the redirection driver refers to the redirected storage space in at least one of files, clusters, virtual clusters, and sectors of data** [the redirection driver refers to the redirected storage space in terms of pages, as shown in figure 2, including ROM data page (212), RAM page (218), by using a page table (202)].

As to claim 64, Harish teaches that **the redirection driver refers to the redirected storage space using multiple data addressing abstractions** [by using the virtual address (figure 2, 204) and the physical address (figure 2, 206) of the page table (figure 2, 202) as shown in figure 2].

As to claim 65, Harish teaches that **the redirection driver refers to the redirected storage space using virtual cluster data abstractions** [by using the virtual address (figure 2, 204) and the physical address (figure 2, 206) of the page table (figure 2, 202) as shown in figure 2].

As to claim 66, refer to "As to claim 5."

As to claim 71, refer to "As to claim 27."

As to claim 72, Harish teaches **a method for protecting data in a storage device of a computer system** [the computer system as shown in figure 1, where ROM and RAM are storage devices] **having an operating system** [The image includes an operating system portion that controls the overall operation of the system and an application portion that directs the specific application of the embedded system (col. 3, lines 36-40)], **a device driver** [First, according to the definition by Microsoft Computer Dictionary (5th edition, Microsoft Press, 2002, page 177), a "driver" is "a

hardware device or a program that controls or regulates another device … A software driver is a device-specific control program that enables a computer to work with a particular device." Based on this definition, the Examiner interprets the element "input/output driver" as "a program that enables a computer to work with an input/output device." Second, figure 1 of Harish shows a computer system comprising a CPU (102), I/O controller (108), a ROM (104) and a RAM (106), and Harish's invention is directed toward a memory manager that supports memory accessing to/from the ROM and RAM by external input/output devices (col. 3, lines 14-27). Further, the functions of the memory manager is implemented in software (as shown in figures 3 and 4; col. 3 line 57 to col. 5, line 17). Thus, it is clear that the functions performed by the memory manager include that of an input/output driver, and more. Third, as Examiner indicated over the phone interview, the overall functions of the memory manager of Harish is broader and more complex than an input/output driver, thus the Examiner is not disputing that they are not the same. However, since the functions performed by the memory manager include that of an input/output driver, it would qualify as an input/output driver within the context of the claimed limitations of claim 3], **an unprotected space** [the RAM, figure 1, 106], **and a storage device having a designated protected space** [the ROM, figure 1, 104], **comprising**:

loading a software redirection driver [it should also be noted that any software must be loaded into a computer system before it can be executed to perform the intended functions. Thus "loading" or "installing" a software driver into a computer system is an inherent step of computer implemented operations; the flowcharts and operations of

the software redirection driver are shown in figures 3 and 4; First, according to the definition by Microsoft Computer Dictionary (5th edition, Microsoft Press, 2002, page 177), a "driver" is "a hardware device or a program that controls or regulates another device … A software driver is a device-specific control program that enables a computer to work with a particular device." Based on this definition, the Examiner interprets the element "input/output driver" as "a program that enables a computer to work with an input/output device." Second, figure 1 of Harish shows a computer system comprising a CPU (102), I/O controller (108), a ROM (104) and a RAM (106), and Harish's invention is directed toward a memory manager that supports memory accessing to/from the ROM and RAM by external input/output devices (col. 3, lines 14-27). Further, the functions of the memory manager is implemented in software (as shown in figures 3 and 4; col. 3 line 57 to col. 5, line 17). Thus, it is clear that the functions performed by the memory manager include that of an input/output driver, and more. Third, as Examiner indicated over the phone interview, the overall functions of the memory manager of Harish is broader and more complex than an input/output driver, thus the Examiner is not disputing that they are not the same. However, since the functions performed by the memory manager include that of an input/output driver, it would qualify as an input/output driver within the context of the claimed limitations of claim 3; the input/output driver hierarchy comprising software layers for performing translating of a virtual address into the corresponding physical address (col. 3 line 57 to col. 4 line 20), accessing physical addresses in ROM or RAM (col. 3 line 57 to col. 4 line 20), and intercepting write-access and test whether the physical access references

data in ROM (col. 4, lines 20-49)] **into a volatile memory of the computer system during power-up initialization** [The operating system initializes a virtual memory manager … (column 4, line 57 to column 5, line 18); note that RAM is a volatile memory];

installing the software redirection driver before the device driver in a calling sequence of the operating system [col. 4, line 57-62; it is inherent that a driver must be installed before it is invoked in a calling sequence], **so that the operating system invokes the redirection driver in response to receiving a request to access the storage device** [it is inherent that a driver must be installed before it is invoked in a calling sequence;];

under control of the redirection driver [the flowcharts and operations of the software redirection driver are shown in figures 3 and 4],

intercepting from requesting code that is external to the redirection driver a request to modify a location referred to by a protected space redirection table or a location referred to by an unprotected space table [Write-access exceptions are intercepted, and a write-access exception caused by an attempt to write to dynamic data in ROM causes the system to allocate a dynamic data page in RAM, copy the ROM data to the RAM, update the page table entry to point to the RAM page rather than the ROM page, and finally to update the dynamic data now present in read-write RAM (abstract); column 4, lines 15-36; the corresponding designated unprotected space is the RAM, figure 1, 106, figure 2, 216; the page table (figure 2, 202) indicates which part is unprotected and which part is protected (col. 4, lines 6-50)];

when the request is to modify a location referred to by the unprotected space table, initiating modification of the location in the unprotected space without redirection [col. 4, lines 20-50; figure 2]; and

when the request is to modify a location referred to by the protected space redirection table, redirecting the request to modify a location in unused storage associated with the location referred to by the protected space redirection table, such that the data in the location in the protected space remains unaltered [col. 4, lines 20-50; figure 2];

Regarding claim 72, Harish does not explicitly mention "in response to a received request to shutdown the computer system, disregarding the data in the redirected space."

However, it is a common knowledge and a common practice that a computer system would be shut down from time to time for the purpose of maintenance or upgrading. For example, the Window operating system provides window commands to allow users to shutdown a PC (START→ SHUT DOWN).

Further, the corresponding designated redirection space of Harish's invention is the RAM (figure 1, 106, figure 2, 216), and the contents of RAM will be lost (i.e., disregard) upon the shutdown of the power because RAM is a volatile memory.

Therefore, it would have been obvious for one of ordinary skills in the art at the time of Applicant's invention to recognize the fact that a computer system would be shutdown from time to time for the purpose of maintenance or upgrading, as exemplified by the PCs running Window operating system, and the fact that the contents of RAM will

be lost (i.e., disregard) upon the shutdown of the power because RAM is a volatile memory, to realize that this particular limitation is a common knowledge and a common practice in the art, hence lacking patentable significance.

As to claim 73, Harish teaches that **the redirection driver cannot be uninstalled by a user without special access privileges, thereby forcing the data to be securely maintained** [The operating system initializes a virtual memory manager … (column 4, line 57 to column 5, line 18); note that RAM is a volatile memory; since the redirection drive is under the control of the operating system and is not accessible by application programs, it cannot be uninstalled by a user without special access privileges, thereby forcing the data to be securely maintained, just like the operating system].

As to claim 74, refer to "As to claim 5."

As to claim 75, refer to "As to claim 5."

As to claim 76, refer to "As to claim 63."

As to claim 77, refer to "As to claim 64."

As to claim 78, refer to "As to claim 30."

As to claim 79, Harish teaches a storage access redirection system for protecting data in designated locations [the designated protected locations are ROM, figure 1, 104] on a storage device in a computer system [the computer system as shown in figure 1, 100], the storage device having a designated unprotected space [the RAM, figure 1, 106], the computer system having an unprotected space, comprising:

an available space table [the page table, figure 2, 202; col. 4, lines 6-50];

a protected space redirection table that is used to designate protected locations [the page table points to the ROM, figure 2, 210] on the storage device that are to be protected from modification [col. 4, lines 6-50];

an unprotected space table that is used to designate unprotected locations on the storage device that can be altered [the page table, figure 2, 202; col. 4, lines 6-50; note that the page table points to the RAM (figure 2, 216]; and

a software redirection driver, installed in a volatile memory of the computer system [it should also be noted that any software must be loaded into a computer system before it can be executed to perform the intended functions. Thus "loading" or "installing" a software driver into a computer system is an inherent step of computer implemented operations; the flowcharts and operations of the software redirection driver are shown in figures 3 and 4; First, according to the definition by Microsoft Computer Dictionary (5th edition, Microsoft Press, 2002, page 177), a "driver" is "a hardware device or a program that controls or regulates another device … A software driver is a device-specific control program that enables a computer to work with a particular device." Based on this definition, the Examiner interprets the element "input/output driver" as "a program that enables a computer to work with an input/output device." Second, figure 1 of Harish shows a computer system comprising a CPU (102), I/O controller (108), a ROM (104) and a RAM (106), and Harish's invention is directed toward a memory manager that supports memory accessing to/from the ROM and RAM by external input/output devices (col. 3, lines 14-27). Further, the functions of the memory manager is implemented in software (as shown in figures 3 and 4; col. 3 line 57 to col. 5, line 17). Thus, it is clear

that the functions performed by the memory manager include that of an input/output driver, and more. Third, as Examiner indicated over the phone interview, the overall functions of the memory manager of Harish is broader and more complex than an input/output driver, thus the Examiner is not disputing that they are not the same. However, since the functions performed by the memory manager include that of an input/output driver, it would qualify as an input/output driver within the context of the claimed limitations of claim 3; the input/output driver hierarchy comprising software layers for performing translating of a virtual address into the corresponding physical address (col. 3 line 57 to col. 4 line 20), accessing physical addresses in ROM or RAM (col. 3 line 57 to col. 4 line 20), and intercepting write-access and test whether the physical access references data in ROM (col. 4, lines 20-49)] upon power-up initialization [The operating system initializes a virtual memory manager … (column 4, line 57 to column 5, line 18); note that RAM is a volatile memory], that when executed, is configured to:

automatically intercept a request to modify one of the designated locations or to modify a location referred to by the unprotected space table [col. 4, lines 20-50; figure 2];

when the request is to modify a location referred to by the unprotected space table, disregard the request so that data in the location referred to by the unprotected space table is modified according to the request [col. 4, lines 20-50; figure 2]; and

when the request is to modify one of the designated locations, use the protected space redirection table to determine whether the designated location has been previously redirected [col. 4, lines 20-50; figure 2];

when it is determined that the designated location has been previously redirected, determine an associated redirected location referred to by the protected space redirection table [col. 4, lines 20-50; figure 2]; and

redirect the request to the associated redirected location [col. 4, lines 20-50; figure 2]; and when it is determined that the designated location has not been previously redirected, allocate a new redirected location based on the available space table [col. 4, lines 20-50; figure 2];

redirect the request to modify one of the designated locations to the new redirected location [col. 4, lines 20-50; figure 2];

record a reference to the new redirected location in the protected space redirection table [col. 4, lines 20-50; figure 2]; and

remove the reference to the new redirected location from the available space table [col. 4, lines 20-50; figure 2].

As to claim 81, refer to “As to claim 3.”

As to claim 84, refer to “As to claim 3.”

As to claim 85, refer to “As to claim 31.”

As to claim 86, refer to “As to claim 31.”

As to claim 87, refer to “As to claim 63.”

As to claim 88, the corresponding designated unprotected space is the RAM, figure 1, 106, figure 2, 216.

As to claim 89, refer to “As to claim 63.”

As to claim 90, refer to “As to claim 5.”

As to claim 91, refer to "As to claim 11."

As to claim 92, refer to "As to claim 64."

As to claim 93, refer to "As to claim 3."

As to claim 94, refer to "As to claim 31."

As to claim 95, refer to "As to claim 31."

As to claim 96, refer to "As to claim 63."

As to claim 97, the corresponding designated unprotected space is the RAM, figure 1, 106, figure 2, 216.

As to claim 98, refer to "As to claim 63."

As to claim 99, refer to "As to claim 5."

As to claim 100, refer to "As to claim 11."

As to claim 101, refer to "As to claim 64."

7. Claims 16-23, 31, 41-46, 49, 65 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harish et al. (U.S. 5,940,850, hereinafter referred to as Harish), and in view of Kobayashi et al. (US 5,437,018).

As to claims 16-17, 20 and 41-42 Harish does not explicitly mention that **the location in the protected space refers to at least one of a sector, a group of sectors, a cluster, or a group of clusters**.

However, the recited data structures of sectors and/or clusters are well known in the storage system and are common knowledge of one of ordinary skills in the art, and the scheme disclosed by Hansen et al. is directly applicable to both sectors and clusters.

Further, Kobayashi et al. disclose in their invention "Emulation of Semiconductor and magnetic Auxiliary Storage Devices with Semiconductor Memory" **a method in a computer system for automatically protecting data stored on a storage device from alteration** [a memory circuit in the semiconductor auxiliary storage comprises ROM and RAM, and a portion of the ROM contents is copied into the RAM so that access modification for programs and data is permitted while the basic program and data is retained in a nonvolatile manner (abstract)], **the computer system having storage and redirected storage** [the RAM space (figure 2, 21) is the redirected storage space as well as the available space (figures 10A~10C)], **when the request refers to an original location that has previously been redirected to redirected storage, using a location in redirected storage as a current redirected location** [column 2, lines 51-68; column 3, lines 1-11; figures 10A~10C], **otherwise allocating available storage to a new location in redirected storage and using the new location as the current redirected location** [column 2, lines 51-68; column 3, lines 1-11; figures 10A~10C]; **and redirecting the access request to refer to the current redirected location**, **such that the request transparently accesses the current redirected location instead of the original location** [column 2, lines 51-68; column 3, lines 1-11; figures 10A~10C]; **and the location in the protected/redirected space refers to at least one of a sector, a group of sectors, a cluster, and a group of clusters** [figures 6-7; figures 10A~10C; columns 7-8].

Therefore, it would have been obvious for one of ordinary skills in the art at the time of Applicant's invention to recognize that the recited elements of sectors and/or

clusters are well known in the storage system and are common knowledge of one of ordinary skills in the art, as demonstrated by Kobayashi et al., that the scheme disclosed by Hansen et al. is directly applicable to both sectors and clusters, and to apply it to storage systems with sectors and clusters to also protect the storage system with sectors and clusters.

As to claims 18, Kobayashi et al. teach that **the sector is a logical sector** [FIGS. 10A-10C illustrate a relationship among a data format, a memory type, and a logical address in the memory space of semiconductor auxiliary storage (column 3, lines 41-43)].

As to claim 19, Kobayashi et al. teach that **the sector is a physical sector** [FIG. 12 is a flow chart of a translation process from a logical address to a physical address (column 3, lines 45-46)].

As to claim 20 and 43, Kobayashi et al. teach that **the location in the protected space refers to a sector** [figures 6-7; figures 10A~10C; columns 7-8].

As to claims 21 and 44, Kobayashi et al. teach that **the location in the protected space refers to an abstraction of storage that is larger than a sector** [figures 6-7; figures 10A~10C; columns 7-8].

As to claims 22 and 45, Kobayashi et al. teach that **the redirected space is organized according to a combination of different storage units** [a plurality of such storage structures are usually provided and a separate semiconductor auxiliary storage may be employed to store software programs as well data (i.e., ROM space) (column 4, lines 21-28), in this case the entire semiconductor auxiliary storage stores the

redirected space (RAM) cross a plurality of separate semiconductor auxiliary storage devices].

As to claims 23 and 46, refer to "As to claim 16" through "As to claim 22." Note that the concept of a "logical" space leads to a "virtual" space.

As to claims 26 and 49, Kobayashi et al. teach that the method of claim 3, **further comprising: receiving a request to shutdown the computer system; and upon receiving the request to shutdown the computer system, disregarding the data in the redirected space** [the RAM data is not saved, and will be lost upon power-down since RAM in general is volatile], **so that when the computer system is rebooted, the data in the protected space of the storage device appears unaltered** [ROM data remains the same because it is read-only].

As to claims 30, 53 and 56, Kobayashi et al. teach **using redirection tables to associate locations in the protected space to locations in the redirected space** [figures 6-7; figures 10A~10C; columns 7-8; figure 11; figure 9; column 2, lines 51-68; column 3, lines 1-11].

As to claims 31 and 70, Kobayashi et al. teach that **the redirection tables comprise at least one of a protected space redirection table, an available space table, and an unprotected space table** [figures 6-7; figures 10A~10C; columns 7-8; figure 11; figure 9; column 2, lines 51-68; column 3, lines 1-11].

As to claim 65, refer to "As to claims 23 and 46."

8. ***Related Prior Art of Record***

The following list of prior art is considered to be pertinent to applicant's invention, but not relied upon for claim analysis conducted above.

- Spear et al., (US 5,367,658), "Interrupt Management Method."
- Piazza, (U.S. 5,603,011), "Selective Shadowing and Paging in Computer Memory Systems."
- Wade et al., (U.S. 5,552,776), "Enhanced Security System for Computing Devices."
- Alexander et al., (U.S. 5,363,334), "Write Protection Security for Memory Device."
- Brant et al., (U.S. 5,848,435), "Address Protection Circuit and Method for Preventing Access to Unauthorized Address Ranges."
- Rose, (U.S. 5,144,660), "Securing a Computer against Undesired Write Operations to or Read Operations from a Mass Storage Device."
- Berglund et al., (U.S. 3,828,327), "Simplified Storage Protection and Address Translation under System Mode Control in a Data Processing System."
- Elliott et al., (U.S. 5,559,993), "Hardware Circuit for Securing a Computer against Undesired Write and/or Read operations."
- Schlotterer et al., (U.S. 3,827,029), "Memory and Program Protection System for a Digital Computer System."
- Belsan et al., (U.S. 5,193,184), "Deleted Data File Space Release System for a Dynamically Mapped Virtual Data Storage Subsystem."

Conclusion

9. Claims 3-9, 11, 13-23, 26, 30-46, 49, 53-54, 56-66, 70-79, 81 and 84-101 are rejected as explained above.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheng-Jen Tsai whose telephone number is 571-272-4244. The examiner can normally be reached on 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Kim can be reached on 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Sheng-Jen Tsai/

TFSA Examiner, Art Unit 2186

September 12, 2008